The FUSION Range of Boilers

INSTALLATION
&
TECHNICAL MANUAL

If you require any further assistance:

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This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

INTRODUCTION

Please read and follow the installation and operating instructions carefully, to ensure the long life and reliable operation of this appliance.

The Electric Heating Company may make minor changes if necessary in the appliance that will not be shown in the operating instructions, so long as the main features of the boiler remain the same.

All boilers come with a 24 month warranty that covers all defects originating from faulty materials and workmanship in the manufacture of the boilers.

The warranty covers the replacement of any faulty parts and labour costs.

The warranty will not cover any damage to the boiler from poor or incorrect installation work.

The warranty will not cover any call out charges that are a user or external control fault.

The warranty will not cover water leaks into the boiler. All plumbing joints must be checked.

The warranty card should be completed and sent back to The Electric Heating Company as soon as possible for registration.

A magnetic filter must be fitted to the system in the horizontal position.

PREPARATION

Instructions and Building Regulations

This appliance must be fitted in accordance with the following instructions.

The Local Building Regulations

The Building Regulations

The Building Standards, (Scotland-consolidated) Regulations.

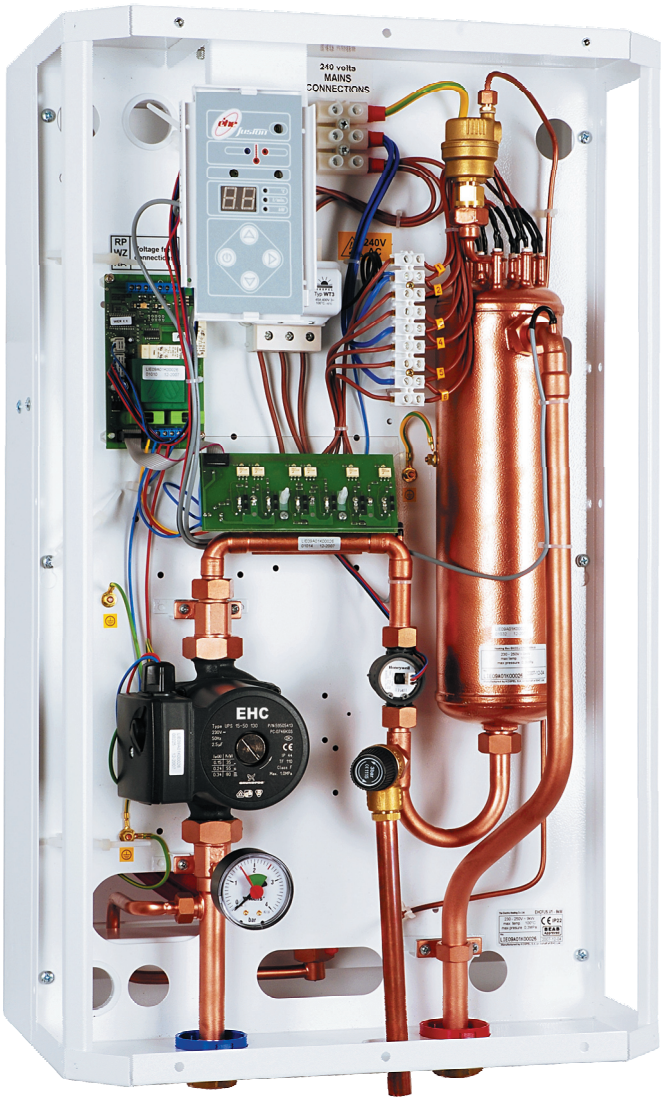
Local water bylaws.

British Standards- code of practice

BS 5449, 1990, forced circulating hot water systems.

BS 7671, IEE wiring regulations.

BS 4814, 1990, Specification for expansion vessels (sealed systems only)



C.O.S.H.H.

Materials used in the manufacture of this appliance are non-hazardous and no special precautions are required when fitting or servicing this appliance.

PREPARATION

1. Load Check

A load check should be taken into consideration when installing high output boilers.

2. Boiler location

The boiler must be fitted on a wall that will provide an adequate fixing, and should be fitted in a location that the boiler and pipe-work are not subject to frost and damp conditions.

3. Central heating

Detailed recommendations are given in BS 5449, BS 6700 and CP 342, Part 2.

Pipes forming part of the useful heating surface should be insulated to prevent any potential heat loss or frost damage. (BS 6700:1997).

Drain valves should be fitted at the lowest point of the system pipe work in an accessible position.

Drain valves should be in accordance with BS 2879 and copper tube to BS 2871. Part 1 is recommended.

LOCATION

The boiler can be installed in almost any location within a domestic or commercial property, however consideration should be given to future maintenance. Never leave the boiler switched off if there is danger of having temperatures below 0°C in the room where it is located.
We recommend that a minimum clearance of 450 mm should be allocated for the removal of the front cover and adequate access to the boiler plumbing and the internal electrical connections. A 50 mm allowance should be made at either side of the boiler to allow free flow air into the boiler case and allow access to screws on the boiler case (150 mm for Slimline model).

THE BOILER MUST BE INSTALLED IN THE UPRIGHT POSITION, FAILURE TO DO SO WILL INVALIDATE THE WARRANTY.

INSTALLATION

The boiler must be installed by a professional plumber or heating engineer and must be connected to the power supply by a qualified electrician.

The Electric Heating Company Ltd will not be held responsible for faulty installations which are performed by unqualified tradespersons.

1. Pipe Connections

All Fusion Electric Boilers have a 22 mm compression connection at the boiler's flow and return pipes. Please note that the boilers are supplied with blank washers fitted for transit purposes. These must be removed and replaced with the washers supplied. The 2 spare pcb fuses supplied must be left inside the boiler.

The flow (red) and return (blue) are clearly marked on the external case and under no circumstances should these connections be reversed.

Hot connections are not recommended at the boiler for future maintenance and boiler disconnection. Lockshield valves are recommended

2. Case Removal

Remove outer screws from boiler case and push upwards and outwards taking care to remove internal earth connections. (Slimline model: remove screws on the right hand side and swing the boiler case open).
Earth connections must be re-connected before the case is reinstated.

3. Isolation valves

Consideration should be made for the provision of lockshield isolation valves on the flow and return pipe-work. Such valves must be full way and not ball valves.

We recommend isolation valves on each side of the magnetic filter.

The insertion of ball valves will reduce the recommended flow through the boiler and promote premature boiler shut down caused by poor flow rate.

4. Auto air vents

An Auto air vent is integral within the boiler however an additional auto air vent must be fitted at the cylinder coil if the boiler is being used for central heating and domestic hot water.

5. Boiler Sizing

Calculate the space heating requirements in accordance with BS 5449. If the boiler is to heat the domestic hot water, an allowance of 3kw (10,239 Btu's) should be made.

6. Insulation

Where practical and if at all possible, we recommend that all pipe-work be insulated, in particular the primary pipe-work within the boiler cupboard. This is to reduce heat loss and reduce high cupboard temperatures from exposed pipe-work. (BS 6700).

7. System Design

As the boilers are of a low water content an open circuit must be achieved incorporating 2 metres of continuous 22 mm pipe-work after boiler connections and before any zone valves.

We recommend the use of an automatic bypass within this circuit and set to the relevant settings to allow the minimum flow rates to pass through the boiler (8 l per min) when all radiator thermostats close.
Allowance should be made for a minimum size radiator of 600mm x 600mm single convector or equal to 2500 Btu to be installed within the heating circuit and locked open. This will be located in the room that has the room stat installed.

To comply with building regulations, Part L and Part J (in Scotland) room and cylinder stats must be fitted.

Note: We do not recommend the use of 8 mm micro-bore pipe.

8. Water connections

Provisions must be made for the replacement of water lost from the heating system (sealed systems). Reference should be made to BS 6798, for the methods of filling and make up of water.

There must be no direct connection between the boilers central heating system and the main water supply. When mains water is required to fill the system directly, all Local water bylaws must be observed. Any connection made must be disconnected after use.

9. Flushing

The system **must be flushed** to ensure that no debris is trapped in the flow sensor as this may result in boiler failure. Where existing radiators and pipework are utilised a powerflush must be carried out to remove debris.

10. System pressures

All boilers are tested to 4.0 bar. The normal working pressure of the boilers should be set to 1.5 bar. All sealed systems should comply with the relevant building regulations and standards and to BS 4814, (Specification for Expansion Vessels).

Please Note
In order to protect the Flow Sensor located within the boiler, it is imperative that you install a mechanical-magnetic filter on the return inlet to the boiler. This will enable you to clean the filter at regular intervals and will also ensure that the boiler does not become contaminated by system residue.

11. System types

The 6,9,12 & 14.4 kW boilers can be used in various system designs. Please refer to The Electric Heating Company for more details on our Fusion Boiler for under floor heating. We are able to supply a heat pack that contains the relevant control valves, cylinder and room thermostats required to configure an S plan heating system. The heat pack has all the necessary components that you need to connect the systems controls and plumbing configurations for S Plan design.

We also recommend the use of thermostatic radiator valves on all radiators except in the room that has the wall thermostat fitted. If a bypass radiator has been used in the system, it should be fitted with lock shield valves and left in the fully open position.

If a bypass radiator has not been used then a system bypass of 2 metres of 22 mm copper pipe incorporating an automatic bypass valve must be used and can be set to 8l/min from the front control panel.

Systems should be designed to current building regulations.

12. System protection

Failure to protect the system will invalidate the manufacturer's warranty.

After the system has been installed the cleansing and inhibiting procedure must be carried out as follows: -

Fill the system with cold mains water to the recommended pressure 1.5 bar and check for leaks, then drain the system thoroughly making sure all drain cocks are fully open and that the system is completely drained.

Add Fernox Heavy Duty restorer through the header tank or via filling loop at the recommended dose. One bottle must be used as a minimum per dwelling. If you are unsure of the correct dose rate, contact Fernox.

Re-fill the system and circulate the heavy-duty restorer prior to the boiler entering modulation mode, then commission the system as normal.

The cleansing agent must be in the system for a minimum 1 hour with the system at normal operating temperature. A longer period of time would be more beneficial to the cleansing process especially if excess flux was used.

Drain and flush the system thoroughly, then add the Fernox Protector (Copal MB1 or Superconcentrate). This will protect against the formation of scale, corrosion and microbiological growths. It is crucial however, that for the protector to work correctly, the system must be properly cleansed and flushed.

The label included within the Fernox Protector carton should be completed and attached adjacent to the boiler.

Note: motorised valves must be manually opened when flushing the system.

Note: If the system is to be drained for any reason, the Fernox Protector must be re-introduced to the system.

Any further information you may require regarding the protection and cleansing products, please contact: -

Fernox Technical Helpline on 0870 870 0362.

Fernox Method Statement for New Domestic Systems

Cleansing and inhibiting a new central heating installation using Fernox Heavy Duty Restorer and a Fernox Protector (Copal, MBI and Superconcentrate).

Procedure:

1. Fill the system with cold mains water to the recommended pressure and check for leaks, then drain the system thoroughly making sure all drain cocks are fully open and that the system is completely drained.

2. Add Fernox Heavy Duty Restorer through the header tank or via a Fernox injector at the recommended dose. One bottle must be used as a minimum per dwelling. If you are not sure of the dose rate, then contact Fernox.

3. Fill the system back up and circulate the Heavy Duty Restorer before the boiler is fired up. Then commission the system in the normal way. The cleansing agent must be in the system for a minimum of I hour with the system at normal operating temperature. A longer period of time would be more beneficial to the cleansing process especially if excess flux was used.

4. Drain and flush the system thoroughly to remove the cleaning chemical and debris present. This is a crucial part of the cleansing process and must be done correctly. Use a rinse test meter (TDS), such as the Fernox CTM. The reading must be within 10% of the mains ppm value.

5. Once the system has been cleansed thoroughly, then add a Fernox Protector (Copal, MB1 or Superconcentrate), to the system. The product must be added as per the manufacturer's instructions. This will protect against the formation of scale, corrosion and microbiological growths. It is crucial, however, that for a protector to work correctly, the system must be properly cleansed and flushed.

6. The sticker included within the Fernox Protector carton should be correctly filled in and attached adjacent to the boiler.

7. Please note: we recommend inhibitor levels are checked on an annual basis (usually during the service) or sooner if the system content is lost. This should be carried out using a Fernox inhibitor test kit.

8. Fernox Technical Services can be contacted on 0870 8700362 for further assistance.

NB: Motorised valves should be manually opened during the flushing process and any anti-gravity valves should be by-passed or removed temporarily.

If it is necessary to cap off the open vent during the mains flush to prevent overflow ensure the cap is removed prior to starting the appliance.

Advice as contained within BS 7593:1992 and PAS33:1999 should be followed in conjunction with this method statement.

Failure to protect systems will void manufacturers warranty.

Water Loss

If water loss occurs due to natural evaporation, leakage or any other breakdown in water seals, the boiler will not operate.

The boilers flow sensor needs a minimum of 4 litres per minute to operate. If this cannot be achieved the boiler will shut down.

We recommend setting to 8l/min.

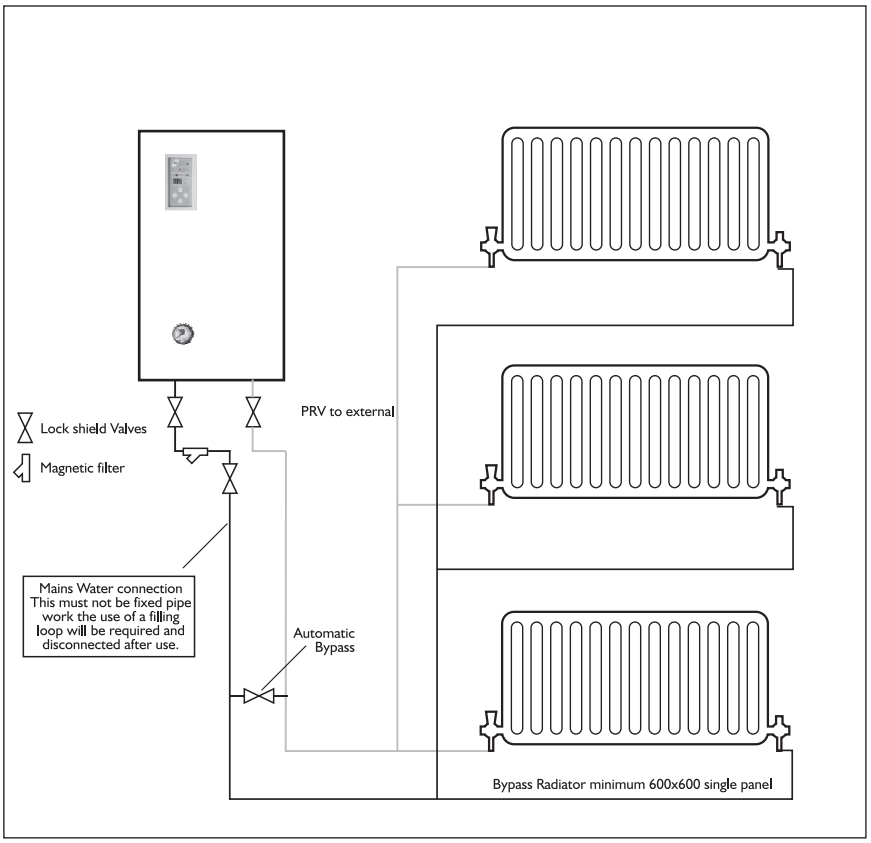
Investigation

Should BOIL OVER/ BOIL DRY /WATER LOSS occur, investigation as to why the system has failed MUST take place. Power should only be reinstated after the fault has been rectified.

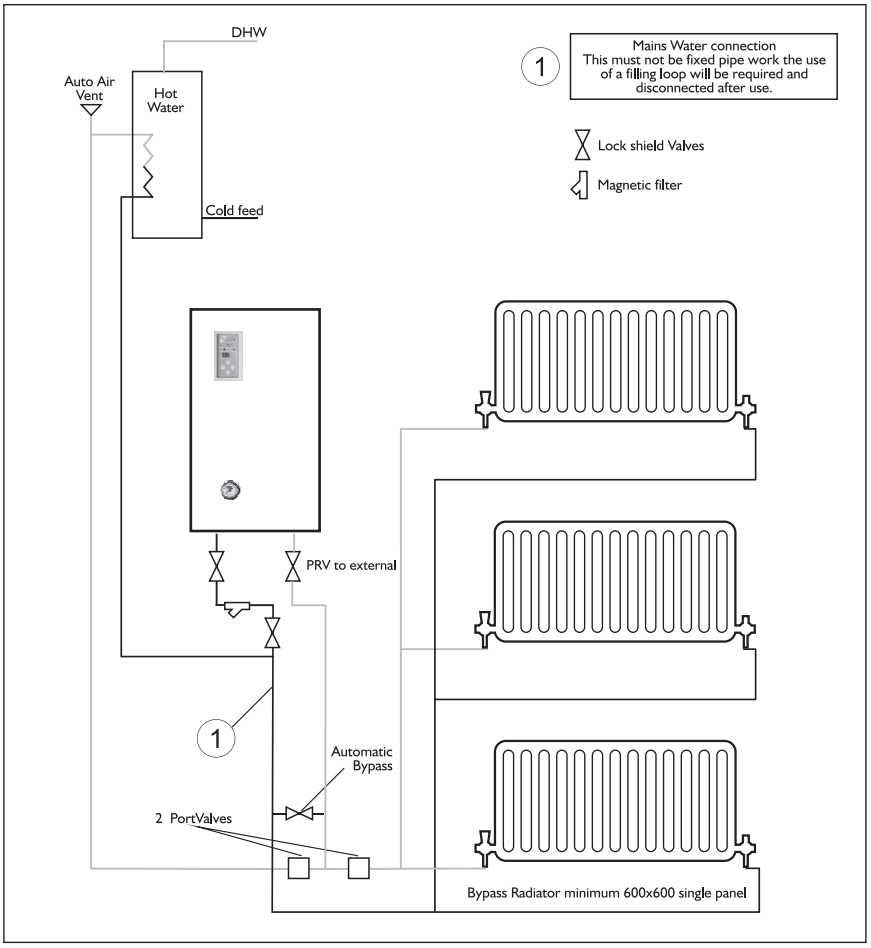
The main overheat stat on the boiler can be re-set, this is positioned at the top of the boiler market WT3. To re-set, push the brass pin with a small screwdriver. The pin will click into place when re-set.

ENSURE THAT THE MAINS POWER SUPPLY TO THE BOILER IS SWITCHED OFF PRIOR TO RE-SETTING.

CENTRAL HEATING ONLY


Lock shield Valves
Magnetic filter
Mains Water connection
This must not be fixed pipe work the use of a filling loop will be required and disconnected after use.
PRV to external
Automatic Bypass
Bypass Radiator minimum 600x600 single panel

CENTRAL HEATING & DOMESTIC HOT WATER



ELECTRICAL CONNECTIONS AND CONTROLS

ALL WIRING MUST BE CARRIED OUT IN ACCORDANCE WITH CURRENT IEE REGULATIONS. BS 7671

ALL ELECTRICAL CONNECTIONS MUST BE MADE BY A QUALIFIED TRADESPERSON.

A load check should be carried out to ensure that there is a sufficient current and voltage for the intended boiler installation. Consideration should be taken into account with regard to the remainder of the properties load requirements.

All boilers must be protected at the meter position with a double pole fused switch with a minimum of 3mm contact separation. If the boiler is not fitted local to the meter position then an isolation switch must be fitted local to the boiler.

THIS APPLIANCE MUST BE EARTHED.

All pipe work must be earthed in accordance with the current IEE Regulations – BS 7671

After completion of all electrical works, an electrical safety check should be carried out i.e. short circuit, earth continuity, resistance to earth and polarity check, and all relevant test certificates produced.

Never open the front cover until all power supplies to the boiler have been disconnected.

ELECTRICAL CONNECTIONS

The boiler connections are clearly marked inside the boiler.
L ⏚ N (24hr LIVE)

The 24hr live is the permanent live connection to the boiler from the mains supply. External controls will require an independent fused spur supplied from the consumer unit.

Boiler Protection

The recommended protection for hard wired boilers are as follows:

Model No.	Boiler size	Protection
FUSION 14.4kW	14.4kW BOILER	80 AMP Protection
FUSION 12kW	12kW BOILER	63 AMP Protection
FUSION 9kW	9kW BOILER	45 AMP Protection
FUSION 6kW	6kW BOILER	32 AMP Protection

External controls

We recommend the use of the EHC Select 107XL Programmer and EHC TLX 4101 room stat for heating only installations.

For Heating and Hot water installations, we recommend the use of the EHC Select 207XL programmer and heat pack.

The heat pack will incorporate all the relevant parts to comply with current building regulations i.e. Motorized valves to control the heating and hot water circuits and Room and cylinder thermostats to control the room and water temperatures. This will also provide boiler interlock. The use of TRV's alone will not provide boiler interlock.

We recommend the use of TRV's, however they must not be used in the room that has the room thermostat fitted.

Note: this control method is to comply with current building regulations
provided by TACMA, the Association of Controls Manufacturers.

Programmer/Stat connections

The boiler PCB has a voltage free connection for the controls (RP). Under no circumstances should 240V be connected to the controller block as this will damage the boiler's PCB and Void the Manufacturers warranty.

The stat / programmer connections are clearly marked within the boiler.

Only after all connections have been made and checked should the system be filled with water and set to the proper pressure 1.5 bar (Sealed systems)

Check the system for leaks. If water leaks into the boiler this may damage the boiler electrics and the **manufacturers warranty will be invalid.**

Under no circumstances should the boiler be switched on when the system is dry.

The boiler has an inbuilt flow sensor. If the boiler has been switched on with a low or no water content, the system flow meter will sense this and prevent the boiler from sending power to the main elements.

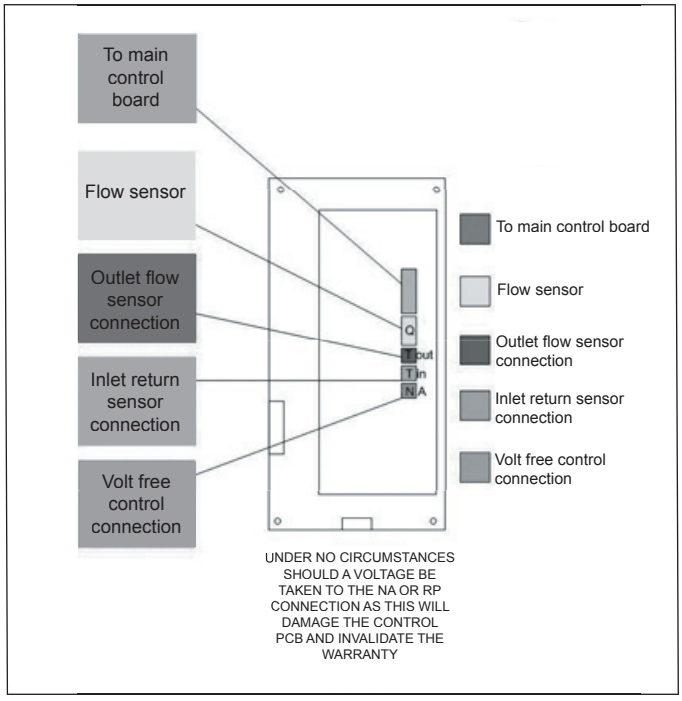
After the system has been filled with water and has had a cold flush the Fernox cleanser should be added, the system filled with water, purged of air and set to the correct pressure 1.5 bar (sealed systems). At this point the main power may be switched on.

At this stage you may carry out the cleansing and protection of the system. Refer to the installation section. (See page 5).

After the cleansing and protection of the system has been done, set the external controls to the customers selected times.

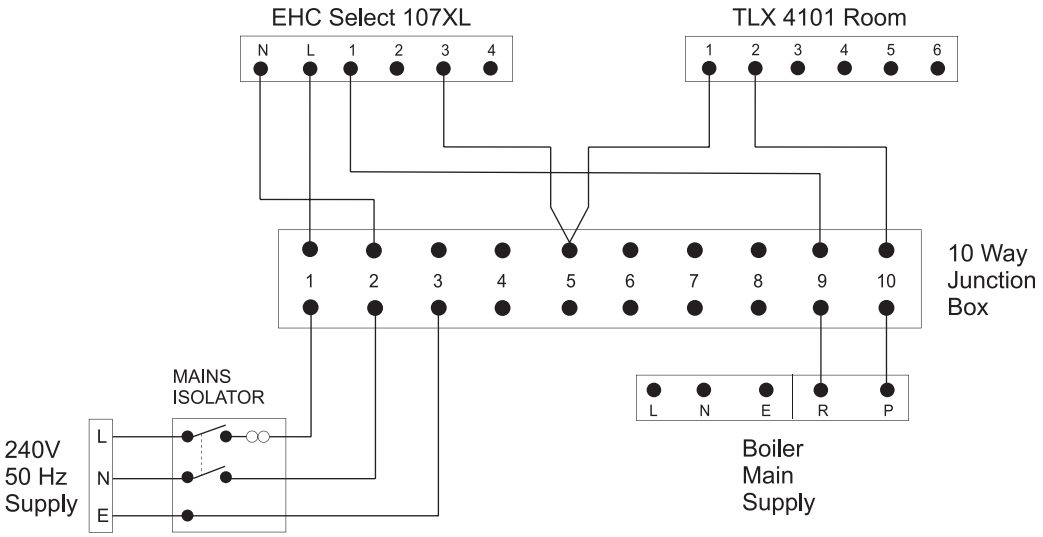
If an off-peak electric meter has been installed by an Electricity Company to supply OFF-peak rate electricity at selected times, the appropriate settings should be entered into to the system programmer to take advantage of the OFF-peak rate electricity.

CONTROL PANEL WIRING CONNECTIONS

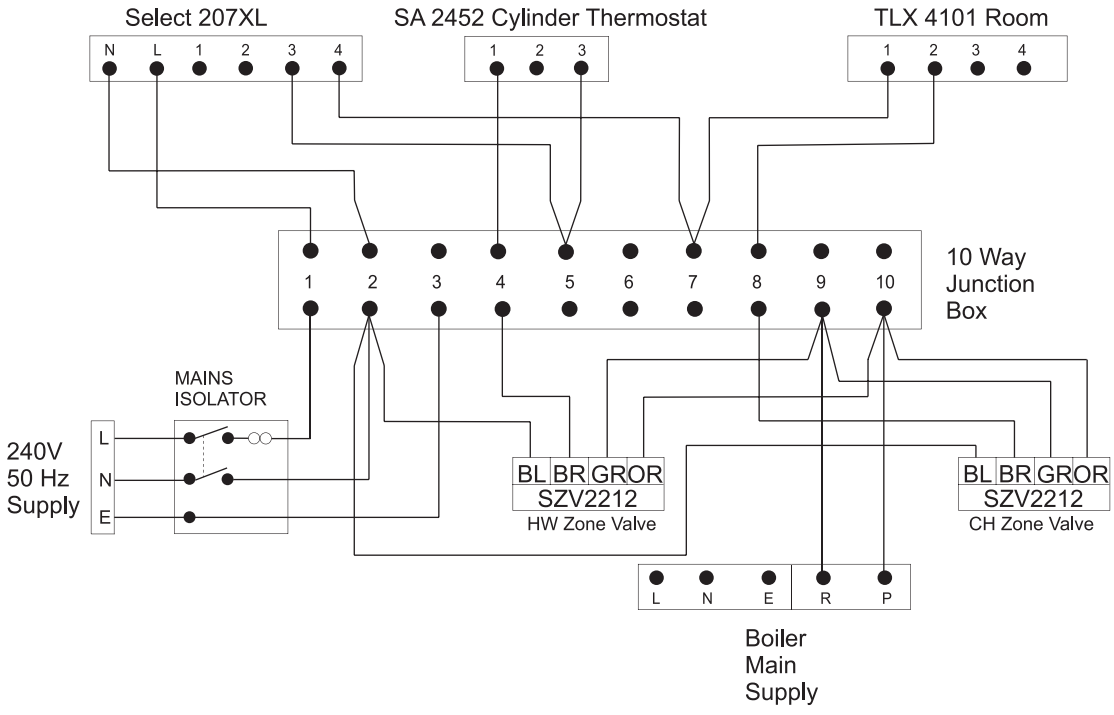

To main control board
Flow sensor
Outlet flow sensor connection
Inlet return sensor connection
Volt free control connection
Q
Tout
Tin
NA
To main control board
Flow sensor
Outlet flow sensor connection
Inlet return sensor connection
Volt free control connection
UNDER NO CIRCUMSTANCES SHOULD A VOLTAGE BE TAKEN TO THE NA OR RP CONNECTION AS THIS WILL DAMAGE THE CONTROL PCB AND INVALIDATE THE WARRANTY

EXTERNAL CONTROL WIRING

Heating Only Wiring

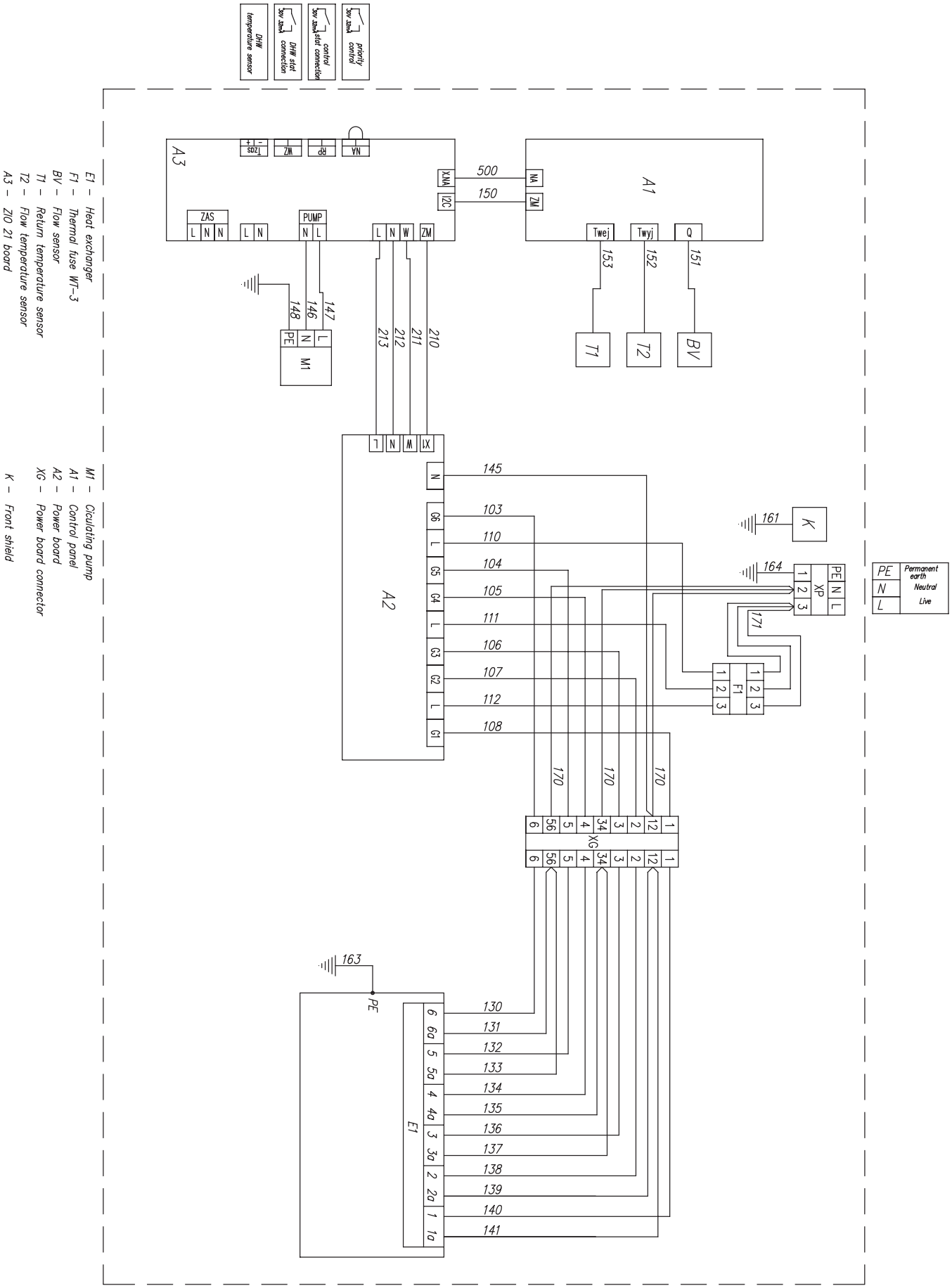


Heating & Hot Water Wiring: S Plan



NOTE!
RP...are
Volt free
Contacts

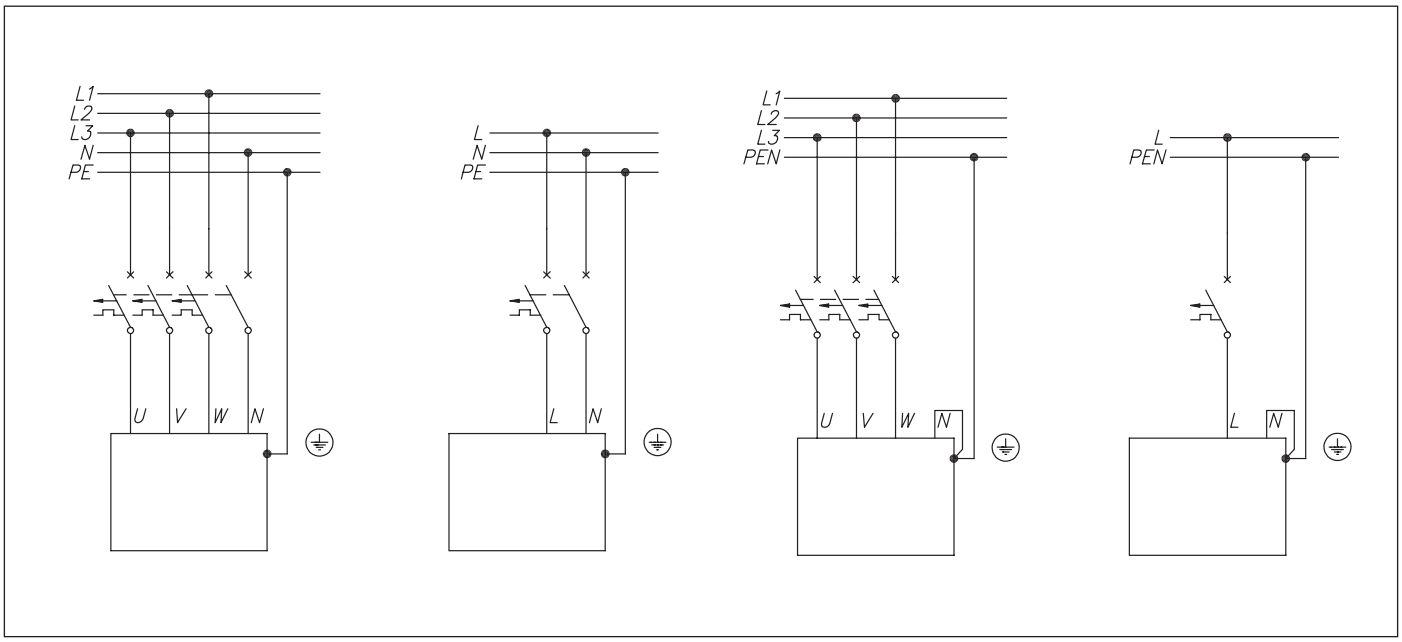
INTERNAL BOILER WIRING



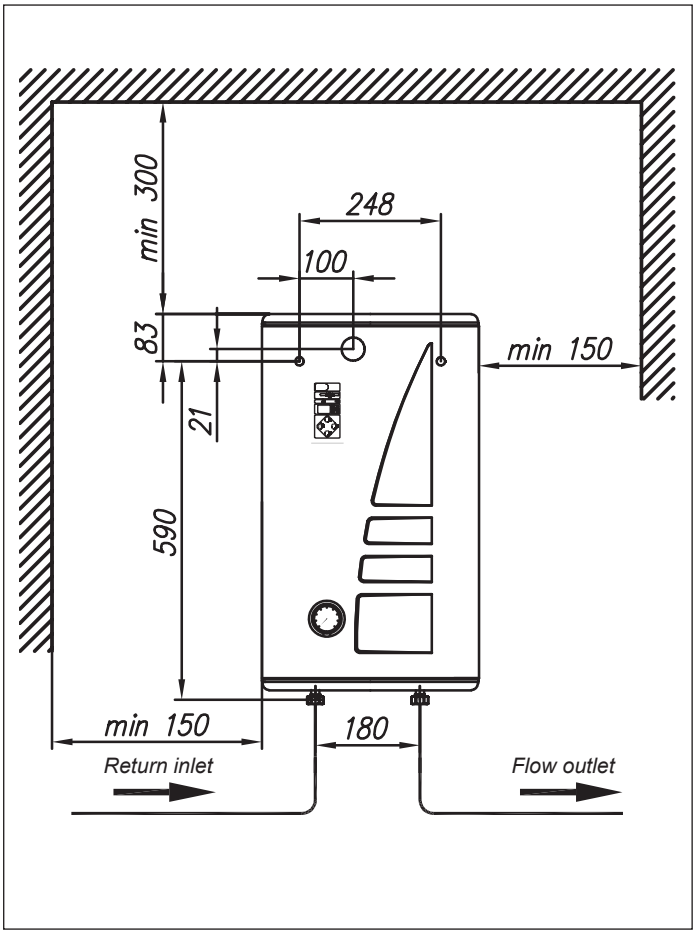
E1 – Heat exchanger
F1 – Thermal fuse WT–3
BV – Flow sensor
T1 – Return temperature sensor
T2 – Flow temperature sensor
A3 – ZIO 21 board

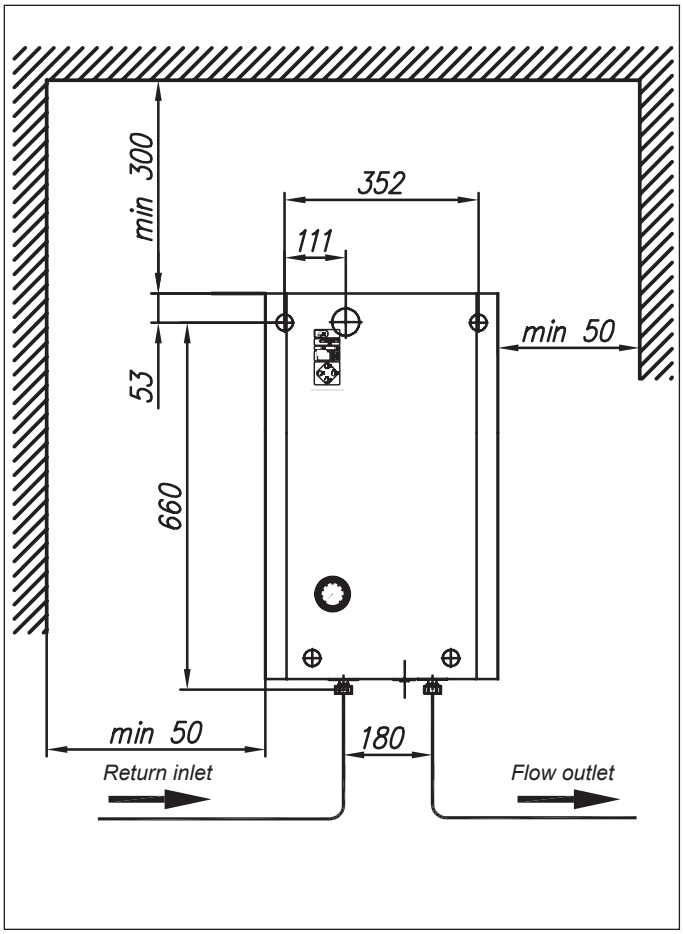
M1 – Circulating pump
A1 – Control panel
A2 – Power board
XG – Power board connector
K – Front shield

EXTERNAL BOILER WIRING



BOILER DIMENSIONS





USER INSTRUCTIONS

Unlike other system boilers such as Gas, Oil and Propane, the FUSION range of electric boilers require no ignition or lighting sequence to be executed by the end user.

All the end user is required to do is ensure that the system is filled with water and the room stat or programmer is calling for heat.

I. Boiler operation

1.1 Switch on unit power supply. Press to switch the boiler on. Switch the boiler off using the same switch by holding it for 2 seconds.

1.2 Switch on programmer or room stat to call for heat.

1.3 When the system reaches the required boiler set point temperature the boiler will modulate and will automatically stage down.

1.4 Modulation - this is when the boiler controls the heating load and the power that is required to maintain the relevant temperature setting.

1.5 During the periods when the boiler is switched off the pump will operate every day for 15 minutes. This protects the boiler and the central heating system from being blocked and silted up.

2. Temperature Setting

We recommend boiler temperature to be set to 65˚C.
Raise and lower the temperature in your installation with the use of the switches and . Refer to the diagram opposite to learn how to adjust the right temperature to make the boiler work comfortably and economically.

ATTENTION: Should the temperature on the front panel be set on too low value the boiler will not reach the required room temperature.

Working parameters control

You can check all the working parametres of the boiler by pressing .

First pressing of switch inlet temperature displayed (indicators “D” and “E” on),

Next pressing of switch – outlet temperature displayed (indicators “F” and “E” on),

Next pressing of switch – medium (water) rate of flow displayed (indicator “H” on),

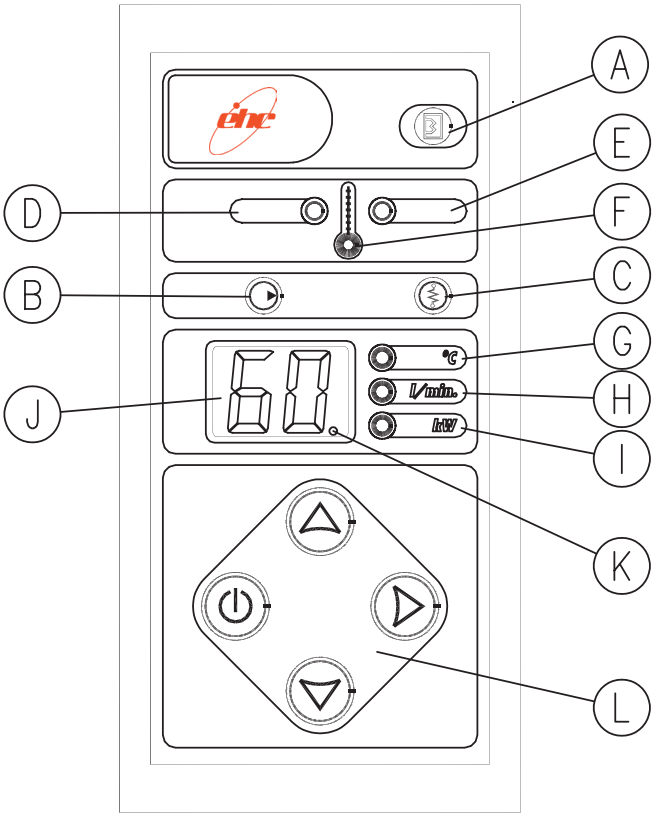
Next pressing of switch – power with which the boiler currently heats (indicator “I” on)

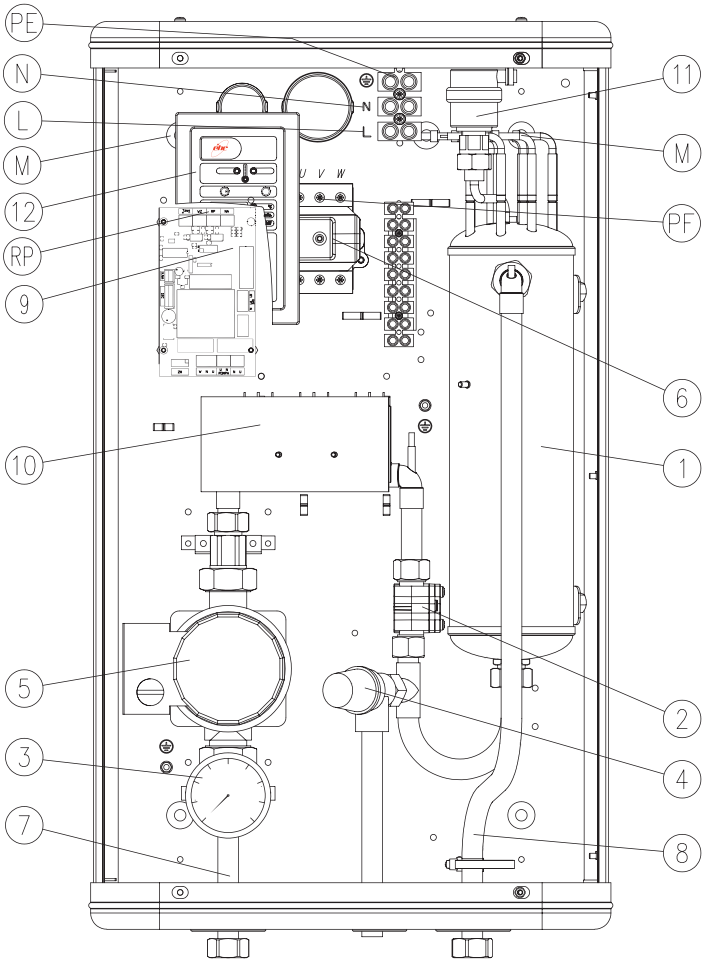
Next pressing of switch – returns to the “standard” state, where you can change the temperature setting in the central heating system.

NOTE: The indicators not only describe the state of the boiler but also inform about failures.

3. Front Control Panel

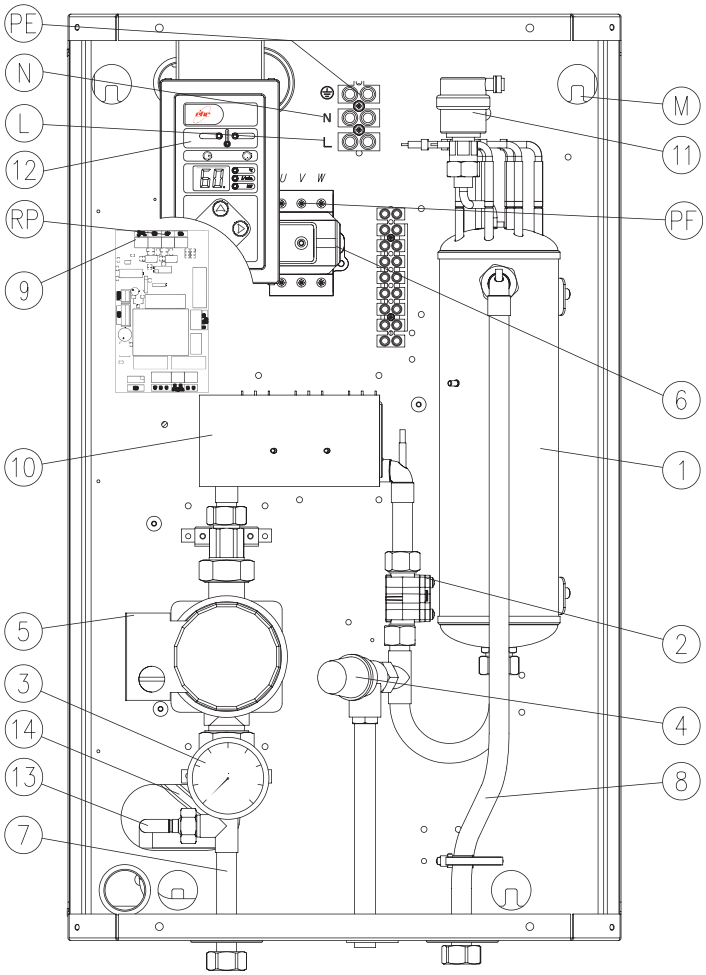
Indicator B	When GREEN light is on the pump is operating. When this light flashes the flow rate is insufficient (less than 5 l per min) Refer to technical specifications
Indicator C	When light is off room thermostat temperature has been achieved. (RP is open) When the green light flashes the NA connection is open. When RED light is on, the boiler is operating When GREEN light is on boiler temperature has been achieved.
Indicator F	Set Temperature
Indicator D	Return Temperature When this indicator flashes the return temperature sensor is faulty.
Indicator E	Flow Temperature When this indicator flashes the flow temperature sensor is faulty.
Indicator G	Press to show Flow, Return and Set Temperature
Indicator H	Press to check flow rate
Indicator I	Press to check power consumption
Indicator A	DHWC Indicator
Indicator K	DHWC temperature indicator (when electronic DHWC temperature sensor is used)





Slimline boiler

1 - heat exchanger
2 - flow sensor
3 - manometer
4 - safety valve
5 - circulating pump
6 - safety temperature limiter
7 - return inlet
8 - flow outlet
9 - ZIO board
10 - power board
11 - automatic vent
12 - control board
PF - points of electric mains connection (phases)
PN - electrical connections
L - live
PE - permanent earth
N - neutral
M - boiler fixing positions
RP - control stat connections

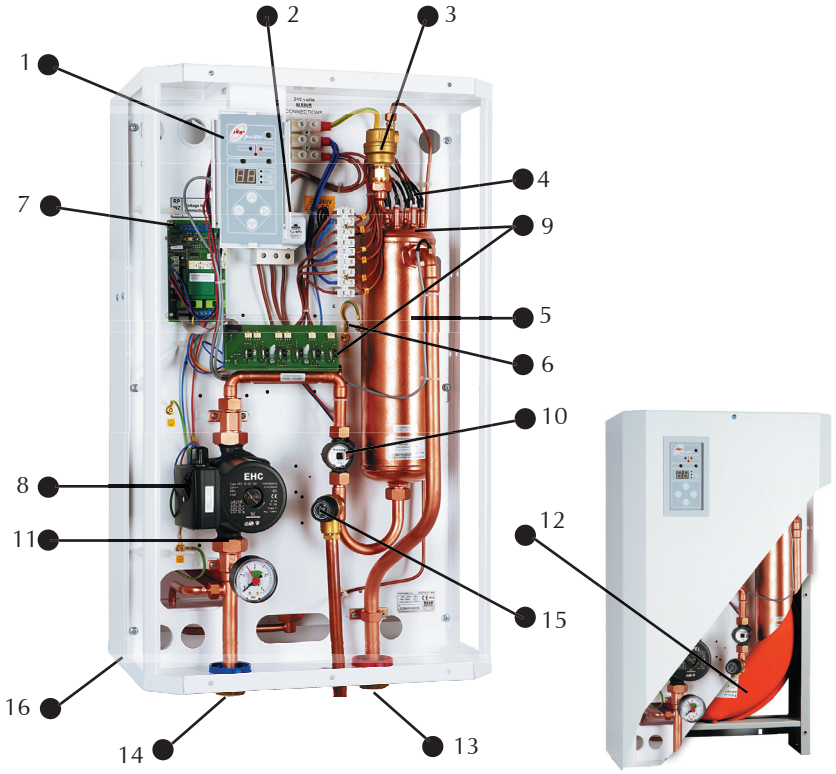


Fusion boiler

1 - heat exchanger
2 - flow sensor
3 - manometer
4 - safety valve
5 - circulating pump
6 - safety temperature limiter
7 - return inlet
8 - flow outlet
9 - ZIO board
10 - power board
11 - automatic vent
12 - control board
13 - expansion vessel connection
14 - expansion vessel
PF - points of electric mains connection (phases)
PN - electrical connections
L - live
PE - permanent earth
N - neutral
M - boiler fixing positions
RP - control stat connections

FAULT FINDING

Symptom	Reason	Procedure
The indicators on the front panel are off	No power to the boiler	Check electricity mains power supply
	Main over heat stat cut-out	Check the power board fuse F2
		Check the WT3 temperature safety cut-out investige cause - possibly fault / return sensors
The „B" indicator is flickering	Flow sensor is blocked	Check flow sensor
		The central heating system airlock - vent the central heating system and the pump
		Check for choked pipes
	Circulating pump is blocked	Move the pump rotor manually
	Flow sensor failure	check the flow sensor and replace if neccesary.
The room thermostat indicates that the boiler is switched on. „C" indicator does not light	Control panel fuse failure	Find the failure reason then replace the fuse.
		Check external controls, room stats, etc. are calling for heat. Link out control stats connections to eliminate external controls If boiler operates the fault is with the external controls
The „D" or „E" indicator are blinking	Temperature sensor failure	Replace temperature sensor.



boiler key

1. Control Panel
2. Over Heat Stat
3. Automatic Air Vent
4. Heating Elements
5. Copper Heat Exchanger
6. Printed Circuit Board
7. Voltage Free Control Connections
8. Circulation Pump
9. Flow & Return Sensors
10. Flow Switch
11. Pressure Guage
12. Expansion Vessel
13. Heating Flow
14. Heating Return
15. Pressure Relieve Valve
16. White Metal Enclosure

TECHNICAL SPECIFICATIONS

Boiler range	**Fusion 6kW** (EHCFUS 6kW)	**Fusion 9kW** (EHCFUS 9kW)	**Fusion 12kW** (EHCFUS 12kW)	**Fusion 14.4kW** (EHCFUS 14,4kW)	**Fusion 24kW** (EHCFUS 24kW)
Pipe entry from boilers	Bottom Entry	Bottom Entry	Bottom Entry	Bottom Entry	Bottom Entry
Central heating flow & return pipes	22 mm				
Min water pressure	1 bar				
Max water pressure	3 bar				
Expansion vessel	6 lt.				
	maximum system water volume about 60 litres at initial system pressure 1,5 bar				
Vessel charge pressure	1,5 bar				
Dry weight	25kg				
Electrical supply	240V 1ph 50Hz				415V 3ph N 50Hz
Load/current	240V; 25,0 Amp	240V; 37,5 Amp	240V; 50,0 Amp	240V; 60,0 Amp	415V; 33,4 Amp
Heating output	20,478 Btu	30,717 Btu	40,956 Btu	49,147 Btu	81,912 Btu
Temp setting (factory set)	85°C				
Min temp setting	40°C				
Overheat Protection	100°C				
Pump included	Yes				
Recommended Pump settings	Set to max				
Protection	32 Amp	45 Amp	63 Amp	80 Amp	40 Amp
The maximum allowed network impedance	0,39 Ω	0,32 Ω	0,24 Ω	0,22 Ω	

NB: Voltage free control connections

Boiler Dimensions

Width 420mm
Height 700mm
Depth 285mm

Controls

Central Heating Only:
EHC Single Channel Heat Pack

Central Heating & Domestic Hot Water:
EHC Twin Channel Heat Pack

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